

REMARKS

Status of the Claims

There have been several Office Actions on this application. In the most recent Office Action, the Examiner rejected claims 1-45 under the second paragraph of 35 U.S.C. 112 as being indefinite, and under 35 U.S.C. 103(a) as being unpatentable over Mellen (U. S. Patent No. 6,058,256) in view of Franaszek (U.S. Patent No. 4,486,739). In addition, the Examiner maintained the previous rejection of claims 1-45 under 35 U.S.C. 103(a) as being unpatentable over Schelkunoff (U.S. Patent No. 2,038,240) in view of Franaszek. The Examiner also noted that the entire concept of twisted wire pair is to physically position the wires to avoid or reduce interference, and that it would have been obvious to apply the concept to any situation where information is being transferred over conductive media. Applicant respectfully disagrees with Examiner's assertions. In order to more clearly point out and distinctly claim the subject matter which applicant regards as his invention, applicant cancels claims 1-45, without prejudice, and adds new claims 46-61 in this response. The patentability of new independent claims 46, 53, and 60 is discussed below with respect to the prior art references on record.

Claim 46

Claim 46 recites, in part:

equalizing a line-to-line coupling from each line to any one of the other lines in the link traversing an entire length of the link by arranging the link in segments, each segment featuring a routing change to reorder proximity of at least one pair of lines relative to any adjacent segment, with a sufficient number of segments such that each line has each of the other lines of the link as a nearest neighbor for at least a portion of the path.

Applicant respectfully submits that none of the cited prior art references on record discloses or suggests the above-recited limitation.

Mellen

Mellen discloses a technique of routing conduction paths in circuit layouts. A crosstalk analyzer is employed to audit the electrical crosstalk incurred in coupled path segments during interconnection. If the crosstalk measure exceeds the acceptable crosstalk limit, interconnections are modified to *reduce* the crosstalk level (Mellen, col. 2, lines 57-66). Reconfiguration alternatives include changing the spacing between two segments (Mellen, Fig. 4, col.5, lines 59-67, and col. 6, lines 1-10), and moving an unbalanced segment relative to balanced segments (Mellen, Fig. 5, and col. 6, lines 28-37). Thus, Mellen teaches a method of "reducing" crosstalk coupling between segments, not a method of "equalizing a line-to-line coupling from each line to any one of the other lines" as recited in applicant's claim 46. Furthermore, Mellen teaches a method of reducing crosstalk by changing the spacing between segments or moving a segment to a different position, not by "reorder[ing] proximity of at least one pair of lines relative to any adjacent segment, with a sufficient number of segments such that each line has each of the other lines of the link as a nearest neighbor for at least a portion of the path" as recited in applicant's claim 46. Therefore, applicant submits that claim 46 distinguishes from Mellen.

The Office Action further contends that one of ordinary skill in the art would know "to experiment and arrange the segments so to *minimize* crosstalk." As provided for in MPEP §2144.03, applicant respectfully request evidence supporting this assertion. To further clarify distinction between the present invention and the prior art, applicant points out again that claim 46 recites a method of "*equalizing* a line-to-line coupling", not a method of "*minimizing*" crosstalk as alleged in the Office Action. Specifically, claim 46 recites a method of routing a signaling link in which "each segment featuring a routing change to reorder proximity of at least one pair of lines relative to any adjacent segment" so as to equalize a line-to-line coupling from each line to any one of the other lines. This routing method is particularly effective in some embodiments wherein the data transmitted over the signaling link are encoded in a manner to maintain a substantially constant number of binary ones and binary zeros (such as recited in dependent claim 47). Applicant asserts that this teaching is not in the prior art, and that there is no motivation in the prior art to modify its teachings to arrive at applicant's invention. Therefore, claim 46 is patentable over the prior

art.

Franaszek

Franaszek teaches an encoder circuit for encoding a digital signal. Since claim 46 does not include any limitation related to encoding, the relevance of this reference is moot.

Schelkunoff

Schelkunoff discloses a method to reduce noise coupled to a coaxial cable from external electric and magnetic fields. The coaxial cable is divided into sections longitudinally. By proper selection of the thickness, conductivity or permeability of the outer conductor, the waves induced in the coaxial cable by external fields are mutually opposed in successive sections and thus tend to cancel each other (Schelkunoff, page 1, right column, lines 5-18). Thus, Schelkunoff teaches a method of *reducing* the noise coupled to a coaxial cable, not a method of "*equalizing* a line-to-line coupling from each line to any one of the other lines in the link" as recited in applicant's claim 46. Furthermore, since a coaxial cable is a two-conductor system, Schelkunoff does not teach "the signaling link comprising *three or more conductive lines*" as recited in applicant's claim 46. Consequently, applicant submits that claim 46 is allowable over Schelkunoff.

"Twisted Pair"

In response to the Examiner's assertion that it is obvious to apply the twisted pair concept to any signaling system, applicant discusses distinctions between the method recited in claim 46 and the twisted pair concept here. Generally, twisted pair cabling is used in differential mode transmission in which the receiver detects the difference between the signals carried by the two wires. Twisting the pair causes the noise coupled to the two wires from an external interfering source to be common-mode which is subsequently cancelled at the receiver. In contrast, applicant's claim 46 recites a method of "*equalizing* a line-to-line coupling from each line to any one of the other lines in the link". Note that a differential mode receiver is not required in this method. Furthermore, claim 46 recites, in part, "the signaling link comprising *three or more conductive lines*," in contrast to *two wires* in the twisted pair concept. Therefore, applicant submits that claim 46 distinguishes from the twisted pair concept, and that it is not obvious to apply the twisted pair concept to solve the problem that confronts the applicant.

In the following, distinctions between claim 46 and prior art references cited in earlier Office Actions are discussed briefly.

Rose (U.S. Patent No. 5,414,393)

Rose discloses a connector comprising four input terminals and four output terminals, and a circuit having four conductive paths between the respective pairs of terminals. Each conductive path is arranged in a zigzag pattern so that the first and the third paths are intertwined to simulate a first twisted pair, and the second and the fourth paths are intertwined to simulate a second twisted pair, and the first and the second pairs are spaced far apart from each other (Rose, Fig. 1, col. 4, lines 26-36). Therefore, in Rose's "zigzag" routing scheme, the first path always has the third path as its nearest neighbor, and the second path always has the fourth path as its nearest neighbor. In contrast, claim 46 recites, in part, "each line has each of the other lines of the link as a nearest neighbor for at least a portion of the path." At least for this reason, claim 46 is allowable over Rose.

Aekins (U.S. Patent No. 6,057,743)

Aekins discloses a distributed noise reduction circuit in a connector. The circuit comprises sets of cascading sections connected in series and spaced from each other between the input and output terminals, each section providing less crosstalk compensation from that provided by the preceding section (Aekins, col. 4, lines 58-67, col. 5, lines 1-24, and Fig. 1). Applicant submits that, nowhere does Aekins disclose or suggest "equalizing a line-to-line coupling from each line to any one of the other lines in the link traversing an entire length of the link by arranging the link in segments, each segment featuring a routing change to reorder proximity of at least one pair of lines relative to any adjacent segment, with a sufficient number of segments such that each line has each of the other lines of the link as a nearest neighbor for at least a portion of the path" as recited in applicant's claim 46. Accordingly, claim 46 is patentable over Aekins.

Alexander (U.S. Patent Publication 2003/0002474)

Alexander discloses a multi-stream merge network for data width conversion and multiplexing. Applicant submits that Alexander lacks at least the "equalizing" step recited in claim 46. Therefore, claim 46 is allowable over Alexander.

Claims 47-52 depend from claim 46 and thus include the above-recited limitation.

Therefore, they are patentable in view of the above remarks.

Claim 53

Claim 53 recites, in part:

a first segment of the path in which a first one of the conductive lines bears a first relationship defined by a substantially constant relative distance along the path to a second one of the conductive lines, and a second relationship defined by a substantially constant relative distance to a third one of the conductive lines;

a second segment of the path in which the first one of the conductive lines bears a third relationship defined by a substantially constant relative distance along the path to the second one of the conductive lines, and a fourth relationship defined by a substantially constant relative distance to the third one of the conductive lines, where at least one of (a) the third relationship is not equal to the first relationship, or (b) the fourth relationship is not equal to the second relationship; and

a third segment of the path in which the first one of the conductive lines bears a fifth relationship defined by a substantially constant relative distance along the path to the second one of the conductive lines, and a sixth relationship defined by a substantially constant relative distance to the third one of the conductive lines, where (a) the fifth relationship is not equal to at least one of the first relationship or the third relationship, and (b) the sixth relationship is not equal to the at least one of the second relationship or the fourth relationship.

For at least the reasons discussed above in reference to claim 46, applicant respectfully submits that none of the cited prior art references on record discloses or suggests the above-recited limitations, and accordingly claim 53 is patentable, and so are dependent claims 54-59.

Claim 60

Claim 60 recites, in part:

means for segmenting the link, each segment featuring a routing change to reorder proximity of at least one pair of lines relative to any adjacent segment, with a sufficient number of segments such that each line has each of the other lines of the link as a nearest neighbor for at least a portion of the path;

Applicant submits that, for at least the reasons discussed above in reference to claim 46, claim 60 is patentable over all the prior art references on record, and so is dependent claim 61.

Rescission of prior implied or express disclaimers

Applicant hereby expressly rescinds any prior disclaimers relating to arguments and/or claim amendments relating to canceled claims 1-45.

In Conclusion

Applicant respectfully submits that all pending claims are in condition for allowance. If a telephone interview would be helpful in any way, the examiner is invited to call the undersigned attorney.

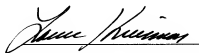
A petition for a 2 (two) month extension of time is enclosed herewith.

Authorization is hereby given to charge deposit account 501914 for any fee deficiency associated with this Amendment.

Respectfully submitted,

SHEMWELL MAHAMDEI LLP

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